Branching data from a clipping experiment conducted on the coral Antillogorgia elisabethae at two sites in the Bahamas determined from June 1999 to June 2000

Website: https://www.bco-dmo.org/dataset/872486
Data Type: Other Field Results
Version: 2
Version Date: 2023-11-07

Project
» Collaborative Research: Pattern and process in the abundance and recruitment of Caribbean octocorals (Octocoral Community Dynamics)
» Recruitment among density manipulated populations of a Caribbean gorgonian (Caribbean Gorgonian Recruitment)

Contributors	Affiliation	Role
Lasker, Howard	State University of New York at Buffalo (SUNY Buffalo)	Principal Investigator, Contact
Heyl, Taylor	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager
Rauch, Shannon	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
This dataset results from an experiment in which colonies of the coral Antillogorgia elisabethae were clipped to simulate harvesting/disturbance at 2 sites in the Bahamas, one at Great Abaco and another at San Salvador Island. This dataset includes per capita branching ratio, number of new branches, and number of new branches per mother branch for colonies that were clipped to 10 or 4 branches or not clipped. Version 2 of this dataset, created on 2023-11-07, includes a correction to the latitude of the Abaco site.

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Coverage

Spatial Extent: **N**:25.9926 **E**:-74.541667 **S**:24.05833 **W**:-77.42675
Temporal Extent: 1999-06 - 2000-06

Methods & Sampling

Colonies of *Antillogorgia elisabethae* were clipped to simulate harvesting/disturbance at two sites in the Bahamas: a 4-meter depth on a reef east of Sandy Point on Great Abaco and a 12-meter depth site off San Salvador Island. At each site, colonies were clipped leaving a shortened primary branch and either 4 or 10 side branches. Both groups of clipped colonies were compared to adjacent colonies that were not clipped. "Control" colonies at Abaco had almost all been clipped for harvest 2-3 years prior to the experiment. There were no previous harvests at San Salvador. Colonies were photographed in June 1999 and June 2000. Photographs were taken at 640 X 480-bit resolution using a Sony Mavica digital camera (either MVC-7 or MVC-FD81) in an

underwater housing. Growth of individual branches was determined by measuring digitized images. To obtain the images, colonies of *A. elisabethae* were carefully positioned between a 10 x 10-centimeter (cm) grid and a clear Plexiglas cover, which held the branches against the grid. The entire colony was photographed. Distortion created by taking the photographs at slight angles from perpendicular was corrected using Photoshop (Ver. 4.0, Adobe). In Photoshop, a 250 x 250-pixel grid was laid over the image and the image was adjusted using the program's distortion function until the 10-cm grid in the image matched the 250-pixel grid. Each branch was labeled with an identifying number and its length was measured using the program ImageJ. Branches were then re-identified in the images from June 2000 and new branches were identified. Per capita branching ratio was calculated by dividing the number of new branches by the number of old branches (branches that were present at the start of the experiment, in the first photo).

Data Processing Description

Photoshop (Ver. 4.0, Adobe) was used to correct photo distortion. The program ImageJ was used to label and measure branch lengths.

BCO-DMO Processing Description

Dataset Version 1 (version date 2022-04-18):
- Adjusted field/parameter names to comply with BCO-DMO naming conventions.
- Added columns for Latitude and Longitude for each site using the coordinates provided in the metadata.
- Rounded values in "PerCapitaRatio" column to 2 decimal places.

Dataset Version 2 (version date 2023-11-07):
Version 2 includes a correction to the latitude value for the Abaco site. This value was incorrect in version 1.
- Imported original file "A.elisabethae_BranchesPerSource.xlsx" into the BCO-DMO system.
- Added columns for Latitude and Longitude for each site using the coordinates provided in the metadata, including the corrected coordinates for Abaco.
- Rounded values in "PerCapitaRatio" column to 2 decimal places.
- Saved the final file as "872486_v2_clipping_expt_branching.csv".

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Data Files

File	
872486_v2_clipping_expt_branching.csv	(Comma Separated Values (.csv), 11.33 KB) MD5:dded5d61632dd94e4a23aa2d67799f9c
Primary data file for dataset ID 872486, version 2.	

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Related Publications

Anderson, E., Castanaro, J., & Lasker, H. R. (2022). Corrigendum: Colony growth responses of the Caribbean octocoral, Pseudopterogorgia elisabethae, to harvesting. 122, 299–307. Invertebrate Biology, 141(1). Portico. https://doi.org/10.1111/ivb.12359
Results

Castanaro, J., & Lasker, H. R. (2003). Colony Growth Responses of the Caribbean Octocoral, Pseudopterogorgia elisabethae, to Harvesting. Invertebrate Biology, 122(4), 299–307. http://www.jstor.org/stable/3227066
General

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Related Datasets

IsRelatedTo

Lasker, H. (2023) **Branch extension measurements from a clipping experiment conducted on the coral Antillogorgia elisabethae at two sites in the Bahamas determined from June 1999 to June 2000.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 2) Version Date 2023-11-08 doi:10.26008/1912/bco-dmo.872600.2 [view at BCO-DMO]

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Parameters

Parameter	Description	Units
Location	Site where experiment was conducted, Abaco or San Salvador	unitless
Latitude	Latitude of the sampling site; positive values = North	decimal degrees
Longitude	Longitude of sampling site; negative values = West	decimal degrees
Treatment	Type of clipping treatment applied to colony: "Clipped (10)" = Clipped to 10 branches; "Clipped (4)" = clipped to 4 branches; "Not Clipped" = not clipped.	unitless
SiteTreat	Location and treatment identifier	unitless
Colony	Identifying number of colony	unitless
NewBranches	Number of new branches identified on colony in July 2000	unitless
OldBranches	Number of original (old) branches on colony in June 1999	unitless
PerCapitaRatio	Per Capita Branching Ratio, calculated by dividing number of new branches by number of old branches	unitless
NumberofMotherBranches	Number of mother branches on colony in July 2000	unitless
MotherBranch	listing out each mother branch	unitless
NewDaughterBranches	number of new branches identified on each mother branch in July 2000	unitless

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Instruments

Dataset-specific Instrument Name	Sony Mavica digital camera (either MVC-7 or MVC-FD81)
Generic Instrument Name	Underwater Camera
Dataset-specific Description	Photographs were taken at 640 x 480-bit resolution using a Sony Mavica digital camera (either MVC-7 or MVC-FD81) in an underwater housing.
Generic Instrument Description	All types of photographic equipment that may be deployed underwater including stills, video, film and digital systems.

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Project Information

Collaborative Research: Pattern and process in the abundance and recruitment of Caribbean octocorals (Octocoral Community Dynamics)

Coverage: St. John, US Virgin Islands

NSF Award Abstract:
Coral reefs are exposed to a diversity of natural and anthropogenic disturbances, and the consequences for ecosystem degradation have been widely publicized. However, the reported changes have been biased towards fishes and stony corals, and for Caribbean reefs, the most notable example of this bias are octocorals ("soft corals"). Although they are abundant and dominate many Caribbean reefs, they are rarely included in studies due to the difficulty of both identifying them and in quantifying their abundances. In some places there is compelling evidence that soft corals have increased in abundance, even while stony corals have become less common. This suggests that soft corals are more resilient than stony corals to the wide diversity of disturbances that have been impacting coral corals. The best coral reefs on which to study these changes are those that have been studied for decades and can provide a decadal context to more recent events, and in this regard the reefs of St. John, US Virgin Islands are unique. Stony corals on the reefs have been studied since 1987, and the soft corals from 2014. This provides unrivalled platform to evaluate patterns of octocoral abundance and recruitment; identify the patterns of change that are occurring on these reefs, and identify the processes responsible for the resilience of octocoral populations. The project will extend soft coral monitoring from 4 years to 8 years, and within this framework will examine the roles of baby corals, and their response to seafloor roughness, seawater flow, and seaweed, in determining the success of soft corals. The work will also assess whether the destructive effects of Hurricanes Irma and Maria have modified the pattern of change. In concert with these efforts the project will be closely integrated with local high schools at which the investigators will host marine biology clubs and provide independent study opportunities for their students and teachers. Unique training opportunities will be provided to undergraduate and graduate students, as well as a postdoctoral researcher, all of whom will study and work in St. John, and the investigators will train coral reef researchers to identify the species of soft corals through a hands-on workshop to be conducted in the Florida Keys.

Understanding how changing environmental conditions will affect the community structure of major biomes is the ecological objective defining the 21st century. The holistic effects of these conditions on coral reefs will be studied on shallow reefs within the Virgin Islands National Park in St. John, US Virgin Islands, which is the site of one of the longest-running, long-term studies of coral reef community dynamics in the region. With NSF-LTREB support, the investigators have been studying long-term changes in stony coral communities in this location since 1987, and in 2014 NSF-OCE support was used to build an octocoral "overlay" to this decadal perspective. The present project extends from this unique history, which has been punctuated by the effects of Hurricanes Irma and Maria, to place octocoral synecology in a decadal context, and the investigators exploit a rich suite of legacy data to better understand the present and immediate future of Caribbean coral reefs. This four-year project will advance on two concurrent fronts: first, to extend time-series analyses of octocoral communities from four to eight years to characterize the pattern and pace of change in community structure, and second, to conduct a program of hypothesis-driven experiments focused on octocoral settlement that will uncover the mechanisms allowing octocorals to more effectively colonize substrata than scleractinian corals on present day reefs. Specifically, the investigators will conduct mensurative and manipulative experiments addressing four hypotheses focusing on the roles of: (1) habitat complexity in distinguishing between octocoral and scleractinian recruitment niches, (2) the recruitment niche in mediating post-settlement success, (3) competition in algal turf and macroalgae in determining the success of octocoral and scleractian recruits, and (4) role of octocoral canopies in modulating the flux of particles and larvae to the seafloor beneath. The results of this study will be integrated to evaluate the factors driving higher ecological resilience of octocorals versus scleractinians on present-day Caribbean reefs.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

Recruitment among density manipulated populations of a Caribbean gorgonian (Caribbean Gorgonian Recruitment)

Coverage: The Bahamas

NSF Award Abstract:

Intellectual Merit:
Recruitment, the addition of new individuals to populations, has played a prominent role in analyses of the population dynamics of marine benthic species. Understanding whether recruits come from local populations (closed populations) or from distant sources (open populations) is essential to our understanding of the dynamics of benthic populations and to the conservation and management of benthic species. These questions are of particular importance for coral reef communities, which are increasingly at risk and require the development of sound conservation policies.

Assessing whether populations are closed or open is methodologically difficult and most such analyses have been inferential in nature. Direct and large-scale manipulations of the density of reproductive individuals could be used to experimentally test whether or not a population is open, but in most cases such manipulations are difficult to undertake due to logistical and environmental constraints. The large-scale manipulation of density of a single species is currently being generated by the harvest of the Caribbean gorgonian, Pseudopterogorgia elisabethae in the Bahamas. P. elisabethae colonies are cropped on a 2 to 3 year rotation and after harvest are no longer of reproductive size. This has created a mosaic of areas all of which can support the species but some of which produce dramatically reduced numbers of eggs and larvae. Examining recruitment in these areas and across a hierarchy of spatial scales, both after harvest and as the number of reproductive colonies increases, will provide a unique opportunity to directly determine whether P. elisabethae populations are closed and on what scale. Recruitment will be monitored follow annual spawning events on the Little Bahama Bank and the origin of recruits assessed from DNA microsatellite analyses of the recruits.

Broader Impacts:
The broader impacts of the study are in large part based on it addressing one of the fundamental questions of marine ecology, whether marine populations are open or closed. In addition, the study focuses on a commercially important species that is currently being harvested in the Bahamas and is under investigation for harvest elsewhere in the Caribbean. The study should therefore be of broad interest to stakeholders such as governmental and nongovernmental organizations interested in the conservation and management of coral reefs.

Educational aspects of the project fall into two categories. Firstly, the project will involve the participation and training graduate and undergraduate students from both the U.S. and the Bahamas. Secondly, the research will form the basis for a case study to be developed for the National Center for Case Study Teaching in Science. The case study will emphasize the process by which research is developed as well as the results of the research. The case study will be used in University at Buffalo undergraduate classes and through the Center's website will be available to instructors throughout the country.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1756381
NSF Division of Ocean Sciences (NSF OCE)	OCE-0327129

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